

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of:
Jianzhong ZHANG, *et al.*
Application No.: 10/080,933
Filed: February 22, 2002

Confirmation No.: 6502
Art Unit: 2611
Examiner: Jean B. Corrielus
Attorney Dkt. No.: 059864.00665

For: APPARATUS, AND ASSOCIATED METHOD, FOR A MULTIPLE-INPUT,
MULTIPLE-OUTPUT COMMUNICATION SYSTEM

PRE-APPEAL BRIEF REQUEST FOR REVIEW

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

May 11, 2010

Sir:

In accordance with the Pre-Appeal Brief Conference Pilot Program guidelines set forth in the Official Gazette Notice of July 12, 2005, Applicants hereby submit this Pre-Appeal Brief Request for Review ("PABRR") of the final rejections of claims 21, 23-28, 30-33, 36-38, 40-42, 46, and 47 in the above identified application. These claims were finally rejected in the Office Action dated February 16, 2010. Applicants filed a Response to the Final Office Action on April 2, 2010. The Office issued an Advisory Action dated April 9, 2010, maintaining the final rejections of claims 21, 23-28, 30-33, 36-38, 40-42, 46, and 47. In the Advisory Action, the Office indicated that the amendments presented in the Response of April 2, 2010, would be entered for purposes of appeal. Accordingly, the objections to Figures 2 and 3 (as presented in paragraph 1 and 3 of the Office Action) and claims 26, 28, and 36 (as presented in paragraph 5 of the Office Action) were withdrawn. Applicants hereby appeal the remaining claim rejections presented in the Office Action and submit this PABRR. A Notice of Appeal is timely filed concurrently herewith.

Applicants submit that a combination of Zangi, Ketchum, and Taylor fails to disclose or suggest every element recited in claims 21, 23-28, 30-33, 36-38, 40-42, 46,

and 47. Applicants respectfully request reconsideration of the pending claims for at least the reasons discussed below.

Clear Error: Independent Claims 21, 32, and 38, and related dependent claims were erroneously rejected as obvious over Zangi, Ketchum, and/or Taylor.

Applicants respectfully submit that the Office Action unreasonably and erroneously grouped the feedback filter 104, the summer 106, and the decision algorithm 108, as described in Zangi, to construe that Zangi discloses the “decision feedback sequence estimator” recited in claim 21, and similarly recited in claims 32 and 38 (*see* Office Action, page 5, “circuits (104, 106, and 108) [are] considered as the claimed “decision feedback sequence estimator” to receive the coefficients (optimized values), note input to filter 104).

Zangi explicitly discloses an equalizer 100, which may be a decision feedback equalizer (DFE) or a decision feedback sequence estimation (DFSE) equalizer. Equalizer 100 includes an equalization filter 101, *a decision algorithm 108*, and a processor 120. Equalization filter 101 includes a prefilter 102, *a feedback filter 104*, and *a summer 106*. Processor 120 includes a channel estimator 122 and an adaptive algorithm 124 (Zangi, Figures 1 and 3; col. 3, line 29, to col. 4, line 60). Thus, equalizer 100, which Zangi explicitly discloses as a DFSE, includes a feedback filter 104, a summer 106, and a decision algorithm 108, *i.e.*, all three structural elements are contained within the DFSE 100 (*see* Zangi, Figure 3). Zangi further explicitly discloses that DFSE 100 includes the pre-filter 102, the channel estimator 122, and the adaptive algorithm 124, *i.e.*, the pre-filter 102, the channel estimator 122, and the adaptive algorithm 124 are also contained within the DFSE 100. Accordingly, one of ordinary skill in the relevant art would have understood that the DFSE 100 is not “configured to receive the generated optimized values” (emphasis added), rather, the optimized values are generated within the DFSE 100. DFSE 100 only receives the “received sequence, $r(k)$.”

Further, Applicants respectfully submit that the Office Action unreasonably and erroneously re-grouped the elements of the DFSE 100, as disclosed in Zangi, to exclude the processor 120, so that the “optimized values” generated within the adaptive algorithm 124 could be received within the newly grouped DFSE (only including the feedback filter 104, the summer 106, and the decision algorithm 108). As previously noted, Zangi explicitly describes that the DFSE includes the processor 120, the channel estimator 122, and the adaptive algorithm 124, and therefore the optimized values are generated within the DFSE 100, not received by the DFSE 100.

Certain embodiments of the invention provide non-obvious advantages. Specifically, certain embodiments of the invention relate to a MIMO communication system, whereby interference cancellation and equalization pre-filtering operations at a receiving station of the MIMO communication system are performed. Hence, the system includes a joint encoder, a MIMO transmission, and a MIMO receiver.

Zangi fails to disclose or suggest, at least, “a signal filter configured to filter a signal from a signal receiver of a multiple-input, multiple-output system” and “wherein an interconnection of the prefilter, the feedback filter, the maximum likelihood sequence estimator, and the summing element in the apparatus is configured to permit concurrent interference and prefilter operations to be performed for a plurality of signals received by a plurality of signal receivers in the multiple-input, multiple-output system,” as recited in claim 21, and similarly recited in claims 32 and 38.

Applicants respectfully submit that the Office Action unreasonably and erroneously combined Zangi with Ketchum to allege that the combination of Zangi and Ketchum discloses the features for the MIMO system recited in claims 21, 32, and 38.

Ketchum is directed to a time-domain transmit and receive processing with channel eigenmode decomposition for MIMO systems. Ketchum discusses techniques for processing a data transmission at a transmitter and receiver. A time-domain implementation is provided in Ketchum that uses frequency-domain singular value decomposition and “water-pouring” results to derive time-domain pulse-shaping and

beam-steering solutions at the transmitter and receiver. The singular value decomposition is performed at the transmitter to determine eigenmodes (*e.g.*, spatial subchannels) of a MIMO channel and to derive a first set of steering vectors used to “precondition” the received signals so that orthogonal symbol streams are recovered at the receiver. Water-pouring analysis is used to more optimally allocate the total available transmit power to the eigenmodes, which then determines the data rate and the coding and modulation scheme to be used for each eigenmode (Ketchum, col. 2, line 25, to col. 3, line 10).

One of ordinary skill in the relevant art would not have found it obvious to combine Zangi with Ketchum. The Office Action alleged that it would have been obvious to combine Zangi and Ketchum to improve signal detection since the system would have been able to be configured to receive multiple copies so that existence of signal error can be easily determined (*see* Office Action on page 6). Applicants respectfully disagree with the allegations presented in the Office Action.

One of ordinary skill in the relevant art would have understood that the fundamental differences between the features for the system discussed in Ketchum and the features of the system discussed in Zangi would have made it non-obvious to combine Zangi and Ketchum. For example, Ketchum discusses applying singular value decomposition (SVD) to derive time-domain *pulse-shaping* and *beam steering* solutions at a transmitter. Additionally, Ketchum discusses the application of the SVD at the receiver to restore orthogonality (*see*, for example, the abstract of Ketchum) of the orthogonal symbol streams. Embodiments of the invention are not directed, nor require, *pulse-shaping*, *beam steering*, or orthogonal symbol streams. One would have concluded that these fundamental differences between Zangi and Ketchum demonstrate that a combination of Zangi and Ketchum would not have been obvious. Furthermore, one of ordinary skill in the relevant art would have understood that such a combination of Zangi and Ketchum would render Zangi unsatisfactory for its intended purpose.

Taylor fails to cure the deficiencies of Zangi and Ketchum for at least the following reasons. Taylor is directed to a transparent data transmission for a

wireless/cellular communication system. An analog signal from a modem or other source is converted at a remote station to a digital bit stream in accordance with a memoryless compaction rule. The resultant bit stream is then transmitted through a transparent channel that includes a wireless cellular-telephone link. At the base station, that bit stream is transmitted over a public-switched-network span (Taylor, para. [0003]-[0005]).

Applicants respectfully submit that Taylor fails to disclose or suggest the decision feedback sequence estimator or the MIMO system recited in claim 21, and similarly recited in claims 32 and 38. Accordingly, claims 21, 32, and 38 recite subject matter that is neither described nor suggested in Zangi, Ketchum, or Taylor, or a combination thereof. Claims 23-28, 30, 31, 46, and 47 depend from, and further limit, independent claim 21. Claims 33, 36, and 37 depend from, and further limit, independent claim 32. Claims 40-42 depend from, and further limit, independent claim 38.

Therefore, the rejections of claims 21, 23-28, 30-33, 36-38, 40-42, 46, and 47 are in clear error and should be summarily withdrawn. Applicants respectfully submit that these claims are in condition for allowance.

Reconsideration and withdrawal of the rejections, in view of the clear errors in the Office Action, is respectfully requested. In the event this paper is not being timely filed, Applicants respectfully petition for an appropriate extension of time. Any fees for such an extension together with any additional fees may be charged to Counsel's Deposit Account 50-2222.

Respectfully submitted,

/Brad Y. Chin/

Brad Y. Chin, Attorney for Applicants
Registration No. 52,738

Customer No. 32294

SQUIRE, SANDERS & DEMPSEY LLP

8000 Towers Crescent Drive, 14TH Floor, Vienna, Virginia 22182-6212

Telephone: 703-720-7800, Fax: 703-720-7802

BYC:dlh

Enclosures: PTO/SB/33 Form, Notice of Appeal